

# CHAPTER-5

## WATER RESOURCES

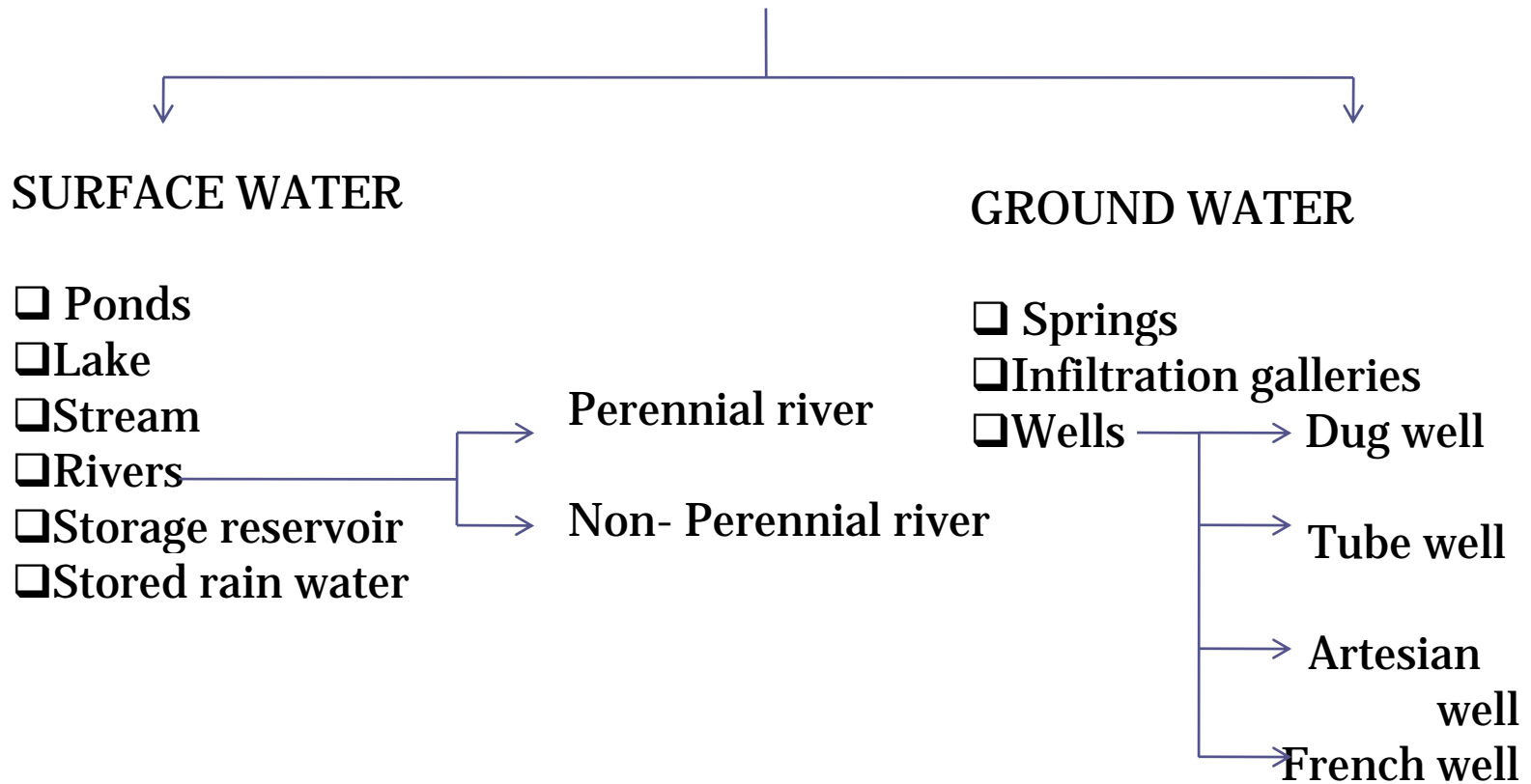
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# INDIAN SCENARIO

- Rainfall area → 3290 lakh ha.
- Rainfall 4000 billion cubic meter annually occur
- Out of total 41 % evaporation, 40 % lost in runoff, 10 % in retail soil moisture and 9 % reeps in recharging ground water
- 8 % FOR IRRIGATION
- 2 % FOR DOMESTIC USE
- 4 % FOR INDUSTRIAL USE
- 12 % FOR ELECTRIC GENERATION

# SOURCES OF WATER



# River Perennial and Non-Perennial

<b>Perennial</b>	<b>Non-Perennial</b>
Those in which water is available throughout the year	Those in which water is not available at all the time
Fed by rains during rainy seasons and by snow during summer seasons	Fed by rains during rainy seasons
It is a source of public supplies directly	The construction of a dam is generally adopted and water is used for irrigation and hydropower etc.



# Ground water

- **Spring:** the natural outflow of ground water at the earth's surface is said to form a spring. A previous layers sandwich between two impervious layer, give rise to a natural spring. It supplies very small amount of water

## CONT...

- **Infiltration galleries:** It is horizontal or nearly horizontal tunnels constructed at shallow depth (3 to 5 m) along the banks of the river through the bearing strata.
- These galleries are generally constructed of masonry walls with roof slabs and derive their water from the aquifer by various porous drain pipes
- These pipes are generally covered with gravel so as to prevent the entry of the fine sand particle into the pipes.
- These tunnels or galleries are generally laid at the slope, and the water collected in them is taken to a sump well, from where it is pumped, treated and distributed to the consumers

# Infiltration galleries



# Infiltration galleries

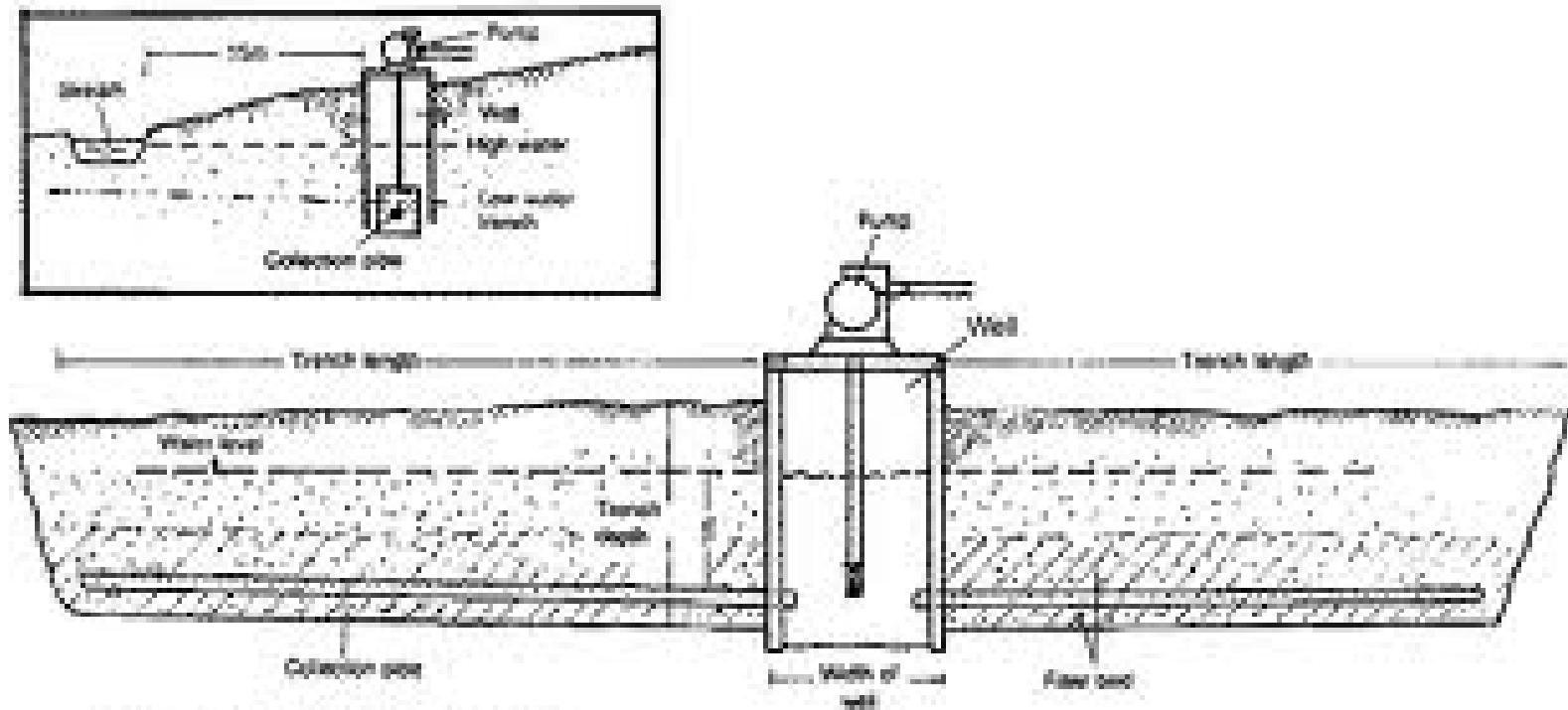



Figure 7. Infiltration Gallery



# Infiltration galleries



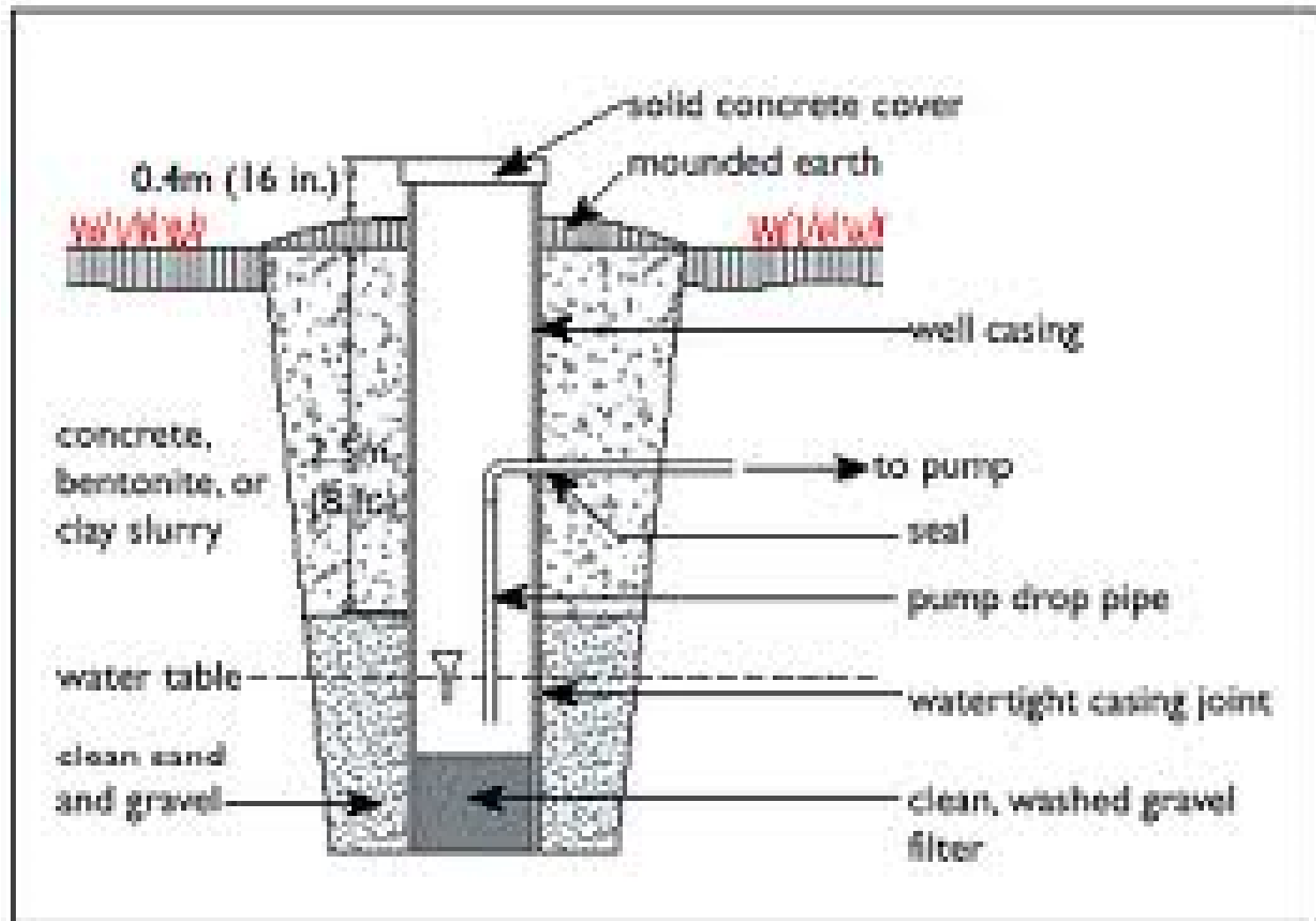


Wells: (1) Dug well or Open wells  
(2) Tube well

### Dug well Or Open well

- Generally open masonry wells, Having bigger diameter (2-9 m) , suitable for low discharge (1-5 lit/sec), less than 20 m depth.
- The yield of the open well is limited because it can be excavated only to a limited depth where the ground water storage is limited

# Dug well Or Open well



# Dug well Or Open well

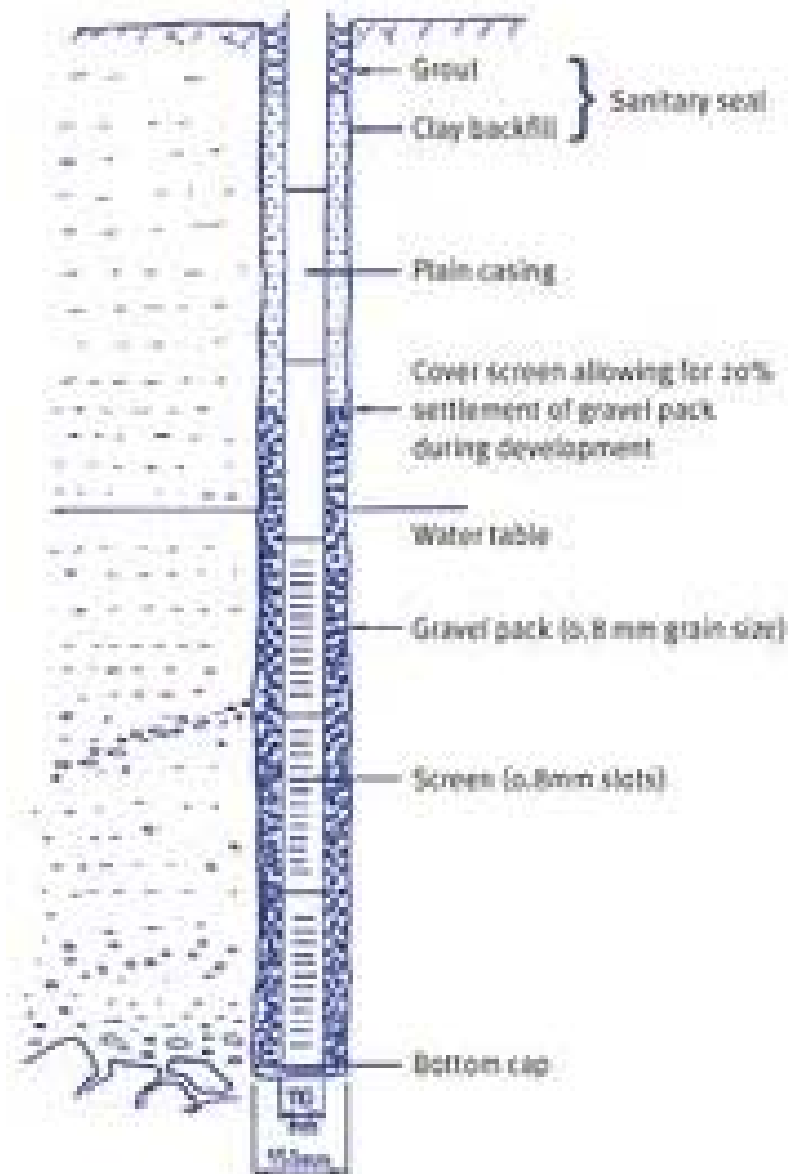


# Tube well

- It is long pipe or a tube, bored or drilled deep into the ground, intercepting one or more water bearing stratum.
- In a tube well, larger discharges can be obtained by getting a higher velocity as well as a larger c/s area of the water bearing stratum



# Tube well

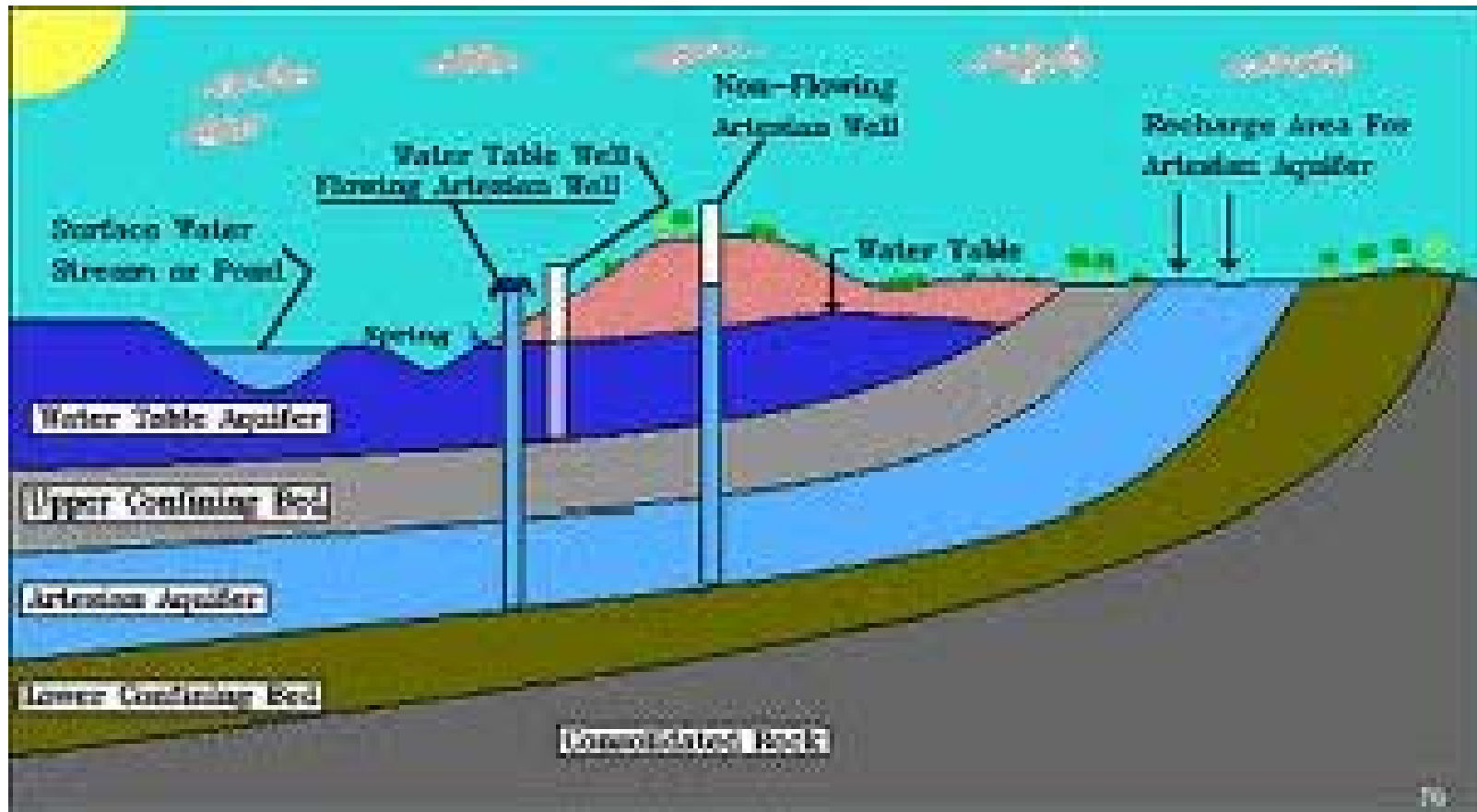




# Artesian well

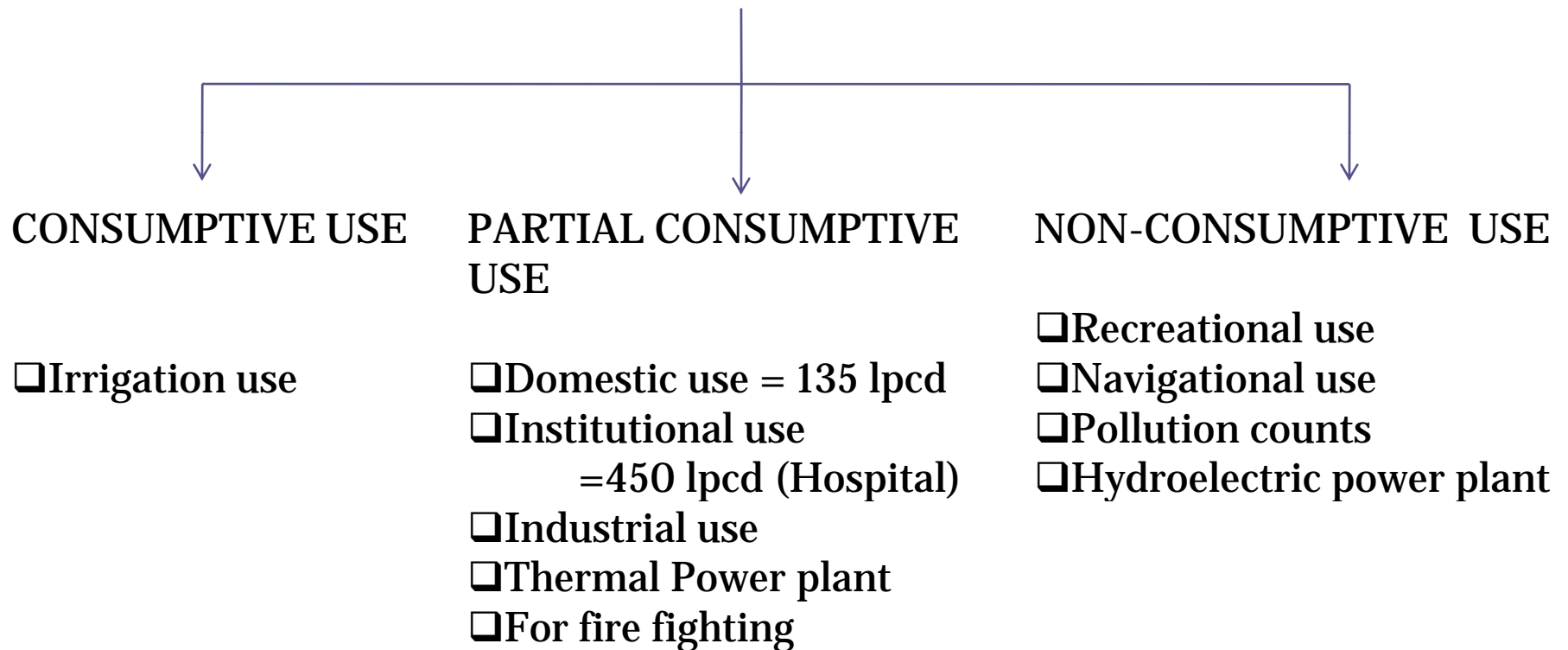
- When a well is constructed in a pervious layer which is bounded between two impervious layer, the water comes on to the surface with some pressure at which it is stored in the layer

# Artesian well





# USES OF WATER



# Domestic use

Use	Water requirement in liters
Drinking	5
Cooking	5
Bathing	55
Washing of clothes	20
Washing of utensils	10
Washing and cleaning of house and residences	10
Flushing of water closets	30
Total	135 lpcd ( liter per capita per day)



# OVER USE OF WATER

- Because of population growth
- Expansion of business activity
- Industrialization
- Increase water service, water supply and sanitation
- Competition for water growing such that many aquifer is depleted
- Direct human consumption as well as agriculture use of water
- Water dispute between state increase water demand due to overuse of water



## PROBLEM DUE TO OVERUSE OF SURFACE WATER

- **Decrease in flow of water in stream and river**
- **Wet land surface reduction**
- **Water logging**
- **Migration of people**



## PROBLEM DUE TO OVERUSE OF GROUND WATER

- A heavily pumped well can lower the local water table as a results of which shallower well go dry
- Heavy pumping, on a border scale, can deplete a whole aquifer
- Excessive pumping of ground water causes porous formations to collapse, resulting in subsidence or settling of the above surface
- Over use of fresh water reservoir along coastlines often allows saltwater to intrude into aquifers used for domestic and agricultural purpose which increase in salinity of water



## Tutorial-5

1. Explain sources of water in details
2. Write a short note on uses of water
3. Write a short note on Over use of water



END